EBI Consulting

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# RADIO FREQUENCY EMISSIONS ANALYSIS REPORT
# EVALUATION OF HUMAN EXPOSURE POTENTIAL TO NON-IONIZING EMISSIONS

T-Mobile Existing Facility

Site ID: CT11373A

Stamford/MP Exit 35-36
1590 Newfield Ave.
Stamford, CT 06905

**November 5, 2016**

**EBI Project Number: 6216005034**

| Site Compliance Summary | |
|---|---|
| Compliance Status: | COMPLIANT |
| Site total MPE% of FCC general public allowable limit: | 6.66 % |

21 B Street · Burlington, MA 01803 · Tel: (781) 273.2500 · Fax: (781) 273.3311

November 5, 2016

T-Mobile USA
Attn: Jason Overbey, RF Manager
35 Griffin Road South
Bloomfield, CT 06002

Emissions Analysis for Site: **CT11373A – Stamford/MP Exit 35-36**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **1590 Newfield Ave., Stamford, CT**, for the purpose of determining whether the emissions from the Proposed T-Mobile Antenna Installation located on this property are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter (µW/cm2). The number of $\mu W/cm^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

All results were compared to the FCC (Federal Communications Commission) radio frequency exposure rules, 47 CFR 1.1307(b)(1) – (b)(3), to determine compliance with the Maximum Permissible Exposure (MPE) limits for General Population/Uncontrolled environments as defined below.

General population/uncontrolled exposure limits apply to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general public would always be considered under this category when exposure is not employment related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limit for the 700 MHz Band is approximately 467 $\mu W/cm^2$, and the general population exposure limit for the 1900 MHz (PCS) and 2100 MHz (AWS) bands is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

Occupational/controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure and can exercise control over their exposure. Occupational/controlled exposure limits also apply where exposure is of a transient nature as a result of incidental passage through a location where exposure levels may be above general population/uncontrolled limits (see below), as long as the exposed person has been made fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Additional details can be found in FCC OET 65.

## CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at **1590 Newfield Ave., Stamford, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was focused at the base of the tower. For this report the sample point is the top of a 6-foot person standing at the base of the tower.

For all calculations, all equipment was calculated using the following assumptions:

1) 2 GSM channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

2) 2 UMTS channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

3) 2 UMTS channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

4) 2 LTE channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel

5) 1 LTE channel (700 MHz Band) was considered for each sector of the proposed installation. This channel has a transmit power of 30 Watts.

6) Since all radios are ground mounted there are additional cabling losses accounted for. For each ground mounted RF path the following losses were calculated. 1.23 dB of additional cable loss for all ground mounted 700 MHz Channels, 2.27 dB of additional cable loss for all ground mounted 1900 MHz channels and 2.33 dB of additional cable loss for all ground mounted 2100 MHz channels. This is based on manufacturers Specifications for 220 feet of 1-5/8" coax cable on each path.

7) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.

8) For the following calculations the sample point was the top of a 6-foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufactures supplied specifications minus 10 dB was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

9) The antennas used in this modeling are the **Commscope SBNHH-1D65B** for 700 MHz, 1900 MHz (PCS) and 2100 MHz (AWS) channels. This is based on feedback from the carrier with regards to anticipated antenna selection. The **Commscope SBNHH-1D65B** has a maximum gain of **15.2 dBd** at its main lobe at 1900 MHz and 2100 MHz and a maximum gain of **12.2 dBd** at its main lobe at 700 MHz. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

10) The antenna mounting height centerline of the proposed antennas is **159 feet** above ground level (AGL).

11) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

12) All calculations were done with respect to uncontrolled / general public threshold limits.

## T-Mobile Site Inventory and Power Data

| Sector: | A | Sector: | B | Sector: | C |
|---|---|---|---|---|---|
| Antenna #: | **1** | Antenna #: | **1** | Antenna #: | **1** |
| Make / Model: | Commscope SBNHH-1D65B | Make / Model: | Commscope SBNHH-1D65B | Make / Model: | Commscope SBNHH-1D65B |
| Gain: | 15.2 dBd / 12.2 dBd | Gain: | 15.2 dBd | Gain: | 15.2 dBd |
| Height (AGL): | 159 | Height (AGL): | 159 | Height (AGL): | 159 |
| Frequency Bands | 700 MHz / 1900 MHz (PCS) / 2100 MHz (AWS) | Frequency Bands | 700 MHz / 1900 MHz (PCS) / 2100 MHz (AWS) | Frequency Bands | 700 MHz / 1900 MHz (PCS) / 2100 MHz (AWS) |
| Channel Count | 9 | Channel Count | 9 | Channel Count | 9 |
| Total TX Power(W): | 330 | Total TX Power(W): | 330 | Total TX Power(W): | 330 |
| ERP (W): | 6,216.67 | ERP (W): | 6,216.67 | ERP (W): | 6,216.67 |
| Antenna A1 MPE% | 1.02 | Antenna B1 MPE% | 1.02 | Antenna C1 MPE% | 1.02 |

| Site Composite MPE% | |
|---|---|
| **Carrier** | **MPE%** |
| T-Mobile (Per Sector Max) | **1.02 %** |
| Sprint | 1.56 % |
| Sensus (CL&P) | 0.12 % |
| AT&T | 1.01 % |
| Clearwire | 0.11 % |
| Nextel | 0.76 % |
| Verizon Wireless | 2.08 % |
| **Site Total MPE %:** | **6.66 %** |

| | |
|---|---|
| T-Mobile Sector A Total: | 1.02 % |
| T-Mobile Sector B Total: | 1.02 % |
| T-Mobile Sector C Total: | 1.02 % |
| | |
| Site Total: | 6.66 % |

| T-Mobile _per sector | # Channels | Watts ERP (Per Channel) | Height (feet) | Total Power Density ($\mu W/cm^2$) | Frequency (MHz) | Allowable MPE ($\mu W/cm^2$) | Calculated % MPE |
|---|---|---|---|---|---|---|---|
| T-Mobile AWS - 2100 MHz LTE | 2 | 1,161.85 | 159 | 3.57 | AWS - 2100 MHz | 1000 | 0.36% |
| T-Mobile AWS - 2100 MHz UMTS | 2 | 580.93 | 159 | 1.78 | AWS - 2100 MHz | 1000 | 0.18% |
| T-Mobile PCS - 1950 MHz UMTS | 2 | 589.01 | 159 | 1.81 | PCS - 1950 MHz | 1000 | 0.18% |
| T-Mobile PCS - 1950 MHz GSM | 2 | 589.01 | 159 | 1.81 | PCS - 1950 MHz | 1000 | 0.18% |
| T-Mobile 700 MHz LTE | 1 | 375.08 | 159 | 0.58 | 700 MHz | 467 | 0.12% |
| | | | | | | **Total:** | **1.02%** |

## Summary

All calculations performed for this analysis yielded results that were **within** the allowable limits for general public exposure to RF Emissions.

The anticipated maximum composite contributions from the T-Mobile facility as well as the site composite emissions value with regards to compliance with FCC's allowable limits for general public exposure to RF Emissions are shown here:

| T-Mobile Sector | Power Density Value (%) |
|---|---|
| Sector A: | 1.02 % |
| Sector B: | 1.02 % |
| Sector C: | 1.02 % |
| T-Mobile Per Sector Maximum: | 1.02 % |
| | |
| Site Total: | 6.66 % |
| | |
| Site Compliance Status: | **COMPLIANT** |

The anticipated composite MPE value for this site assuming all carriers present is **6.66%** of the allowable FCC established general public limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

FCC guidelines state that if a site is found to be out of compliance (over allowable thresholds), that carriers over a 5% contribution to the composite value will require measures to bring the site into compliance. For this facility, the composite values calculated were well within the allowable 100% threshold standard per the federal government.